

09/476558B

1                   ABSTRACT OF THE INVENTION

2                   Antireflective structures according to the present invention comprise a metal  
3                   silicon nitride composition in a layer that is superposed upon a layer to be patterned that  
4                   would otherwise cause destructive reflectivity during photoresist patterning. The  
5                   antireflective structure has the ability to absorb light used during photoresist patterning.  
6                   The antireflective structure also has the ability to scatter unabsorbed light into patterns  
7                   and intensities that are ineffective to photoresist material exposed to the patterns and  
8                   intensities.

9                   Preferred antireflective structures of the present invention comprise a  
10                  semiconductor substrate having thereon at least one layer of a silicon-containing metal or  
11                  silicon-containing metal nitride. The semiconductor substrate will preferably have  
12                  thereon a feature size with width dimension less than about 0.5 microns, and more  
13                  preferably less than about 0.25 microns.

14                  One preferred material for the inventive antireflective layer includes  
15                  metal silicon nitride ternary compounds of the general formula  $M_xSi_yN_z$  wherein M is at  
16                  least one transition metal, x is less than y, and z is in a range from about 0 to about 5y.  
17                  Preferably, the Si will exceed M by about a factor of two. Addition of N is controlled by  
18                  the ratio in the sputtering gas such as Ar/N. Tungsten is a preferred transition metal in  
19                  the fabrication of the inventive antireflective coating. A preferred tungsten silicide target  
20                  will have a composition of silicon between 1 and 4 in stoichiometric ratio to tungsten.  
21                  Composite antireflective layers made of metal silicide binary compounds or metal silicon  
22                  nitride ternary compounds may be fashioned according to the present invention depending  
23                  upon a specific application.

24                  G:\DATA\PAT\11675130.1PA